CLAIMS

What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. A method for the manufacture of a *botulinum* antitoxin composition comprising:

injecting an animal with a monovalent *botulinum* toxoid and toxin to produce immunoglobulins and collecting plasma containing the immunoglobulins from the animal;

purifying the immunoglobulins from the plasma by affinity chromatography; and

digesting the purified immunoglobulins by a proteolytic enzyme to obtain a monovalent *botulinum* antitoxin composition.

2. The method of claim 1, wherein the animal is a horse.

3. The method of claim 1, further comprising combining a plurality of monovalent *botulinum* antitoxins for different *botulinum* toxins to create a polyvalent *botulinum* antitoxin composition.

4. The method of claim 3, wherein the polyvalent *botulinum* antitoxin composition comprises antitoxin for seven different *botulinum* toxins.

5. The method of claim 4, wherein the antitoxins for serotypes A, B, C, E, and F have a potency > 4,000 International Units and the antitoxins for serotypes D and G have a potency > 500 International Units.

6. The method of claim 1, wherein the affinity chromatography uses immobilized Protein G.

7. The method of claim 3 further comprising supplementing the polyvalent *botulinum* antitoxin with *botulinum* monoclonal antibodies.

8. The method of claim 7, wherein the monoclonal antibodies are produced from mouse myeloma cells and equine lymphocyte hybridomas.

9. The method of claim 7, wherein the monoclonal antibodies are directed against *botulinum* neurotoxins selected from the group consisting of neurotoxins F and G.

10. The method of claim 1, wherein the animal is injected intradermally with toxoid.

11. The method of claim 1 further comprising injecting the animal with *botulinum* toxin after the toxoid injections and before collecting the plasma.

12. The method of claim 1, wherein the injected toxoid further comprises an adjuvant.

13. The method of claim 1, wherein the animal is injected with a first injection of toxoid and a second injection of toxoid.

14. The method of claim 13, wherein the first injection comprises about 2 mg of toxoid.

15. The method of claim 13, wherein the first injection is injected at multiple sites at about 0.1 mL per site.

16. The method of claim 13, wherein the first injection further comprises Complete Freund's Adjuvant.

17. The method of claim 13, wherein the second injection is given about 14 days after the first injection.

18. The method of claim 13, wherein the second injection comprises about 0.5 mg of toxoid.

19. The method of claim 13, wherein the second injection further comprises Incomplete Freund's Adjuvant.

20. The method of claim 13, wherein the second injection is injected at multiple sites at approximately 0.1 mL per site.

21. The method of claim 13, wherein a priming dose of toxin is injected after the second injection of toxoid.

22. The method of claim 1, wherein the animal is injected with purified toxin about 7 to 10 days before the plasma is collected.

23. The method of claim 1, wherein the animal is injected with purified toxin conjugated to Keyhole limpet hemocyanin about 7 to 10 days before the plasma is collected.

24. The method of claim 1, further comprising clarifying the plasma through a filter after the plasma is collected.

25. The method of claim 24, wherein the filter comprises pore sizes selected from the group consisting of 2.0 μ, 1.2 μ, 0.5 μ, and 0.22 μ.

26. The method of claim 1, wherein the affinity chromatography is performed at a pH between about pH 10 - 12.

27. The method of claim 1, wherein the affinity chromatography is performed at about pH 11.

28. The method of claim 1, wherein pepsin is used to digest the purified immunoglobulins.

29. The method of claim 1, wherein the digesting is performed at a pH between about pH 2.5 - 6.0.

30. The method of claim 29, wherein the pH is about pH 4.5.

31. The method of claim 1, wherein the immunoglobulins are digested at a temperature of about 20-70°C.

32. The method of claim 31, wherein the temperature is about 58°C.

33. The method of claim 1, wherein the digested immunoglobulins are concentrated to about 90-100 mg/mL protein.

34. The method of claim 1, wherein the digested immunoglobulins are purified on an anion exchange column.

35. The method of claim 1, further comprising lyophilizing the antitoxin composition.

36. A *botulinum* antitoxin composition prepared by the method of claim 1.

37. The *botulinum* antitoxin composition of claim 36, having a pH in the range of about 6-8.

38. The *botulinum* antitoxin composition of claim 36, wherein the composition has a purity of at least about 95%.

39. The *botulinum* antitoxin composition of claim 36, wherein the composition has a protein concentration in the range of about 30-70 mg/ml.

40. The *botulinum* antitoxin composition of claim 36, wherein the composition comprises at least about 60% $F(ab')_2$ and about 40% or less of Fab' or Fab.

41. A method for the manufacture of a heptavalent *botulinum* antitoxin composition comprising:

injecting a plurality of horses with monovalent *botulinum* toxoid mixed with an adjuvant,

injecting the horses with toxin after the injections of toxoid;

collecting from the horses plasma containing immunoglobulins and purifying the immunoglobulins from the plasma by affinity chromatography using immobilized Protein G, wherein the chromatography is performed at about pH 11;

digesting the purified immunoglobulins with pepsin at a temperature of about 58°C and a pH of about 4.5;

filtering the digested immunoglobulins to obtain a monovalent *botulinum* antitoxin;

combining the monovalent *botulinum* antitoxins from the plurality of horses to create a polyvalent composition;

supplementing the polyvalent composition with monoclonal antibodies directed against *botulinum* toxins F and G to produce a heptavalent composition; and

lyophilizing the heptavalent composition.

42. A method of treating an animal in need of *botulinum* antitoxin by administering an effective amount of the antitoxin produced by the method of claim 1.

43. The method of claim 42 wherein the antitoxin is administered intravenously.

44. A method of preventing *Clostridium botulinum* poisoning comprising administering an effective amount of the antitoxin produced by the method of claim 1.

45. A *botulinum* antitoxin composition comprising antitoxin for *botulinum* toxins A, B, C, D, E, F, and G.

46. The composition of claim 45, wherein the antitoxins for *botulinum* toxins A, B, C, E, and F have a potency > 4,000 I.U. and the antitoxins for toxins D and G have a potency > 500 I.U.

47. The composition of claim 45 , wherein the composition comprises about 95% of at least one member selected from the group consisting of $F(ab')_2$,Fab, and Fab'.

48. The composition of claim 45, wherein the composition comprises at least about 60% $F(ab')_2$ and about 40% or less of Fab' or Fab.